UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
RANGE RESEARCH

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BRANCH OF RESEARCH

May, 1930

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FOREST EXPERIMENT STATIONS

ALLEGHENY FOREST EXPERIMENT STATION

General

The program meeting of the Allegheny Council was held in Philadelphia on May 14. Eight members of the Council were present, and a ninth sent a representative. The guests of the Council included Mr. Munns and Mr. Backus from Washington, Professor R. C. Hawley of Yale, Professor L. G. Romell of Cornell, Mr. George H. Wirt, in charge of forest protection for Pennsylvania, and Mr. John Curry occupying the same position in Maryland. Mr. L. W. R. Jackson, who will be reappointed in the B.P.I. on June 16, and will be assigned to one of the two Philadelphia positions, was also invited. By reducing the detail in which the Station program was presented, it was possible to hear several of the visitors at some length. Mr. Munns reported briefly on the Forest Survey. Dr. Illick described the work of the new Pennsylvania Forest Research Institute at Mont Alto, listing 18 main projects on which the first work of the Institute will be concentrated. Particular emphasis will be laid on the more or less practical problems of the State Forests. Mr. Hawley spoke on the management of the lands of the New Haven Water Company, an example of forest management which is of considerable interest in the densely populated East. Dr. Romell made a very effective presentation of the place of research in the development of forestry in Europe. Forestry has been practised in many parts of Europe for centuries, but formal forest research is a relatively new thing. Dr. Romell felt that it could not be said that forest research had so far resulted in any radical departure in European forest practice; rather, it has fortified practices which early trial here and there had shown to be good, and has headed off the adoption locally of dangerous and unsound hypotheses of forest management. By generalizing and making useful the empirical observations of practising forestry, it has put silviculture on a very much surer basis. Dr. Romell in a very interesting way illustrated these statements by citing what had been accomplished in specific lines of forest research, particularly by Dr. Hesselman of the Swedish Forest Experiment Station. He insisted that forest research "is not witchcraft;" it can not be expected, by shortcut methods, to reach sound conclusions over night. He did not see any reason why the American forestry profession should expect any more of research than the European profession does. Certainly the European foresters today recognize the need for continuing research.

Considerable discussion developed around the Station's proposal for a fire damage study on Catoctin Mountain in Maryland. Mr. Curry of Maryland strongly advocated participation of the Station in a much broader study of the entire fire situation on the Mountain, including the administrative phases of the matter. Captain Wheeler was inclined to agree with

(Over)

him. The Pennsylvania foresters, however, opposed administrative studies by the Experiment Station, and the Station's recommendations were finally approved by the Council at large. This means that some work will start during the coming season on the project, but owing to the press of other work which needs to be done as a follow-up of going projects it will not be very extensive. However, the entire program has yet to be approved in the Branch.

A most disastrous fire destroyed the major portion of the forest growth on 106 out of our 340 acres at Camp Ockanickon, on May 5. The fire was one of a series which burned over a substantial percentage of the middle district of New Jersey during a week or ten days of extremely dry weather, or rather the culmination of a drought of several weeks duration. Driven by a high wind, the fire jumped a thirty-foot road which protected the Ockanickon Tract on the east, and in spite of the very best efforts of Wood, Hough, Schnur, Morey, McComb, and a number of volunteer workers from the Y.M.C.A. organization, it burned some promising young growth on the southeast end of the tract. The local warden was spending most of his time on the head fire some miles away, so that our men had to bear the brunt of the fighting on the Y.M.C.A. tract. They described the fire as having burned very fiercely, often throwing flames 30 and 40 feet in the air, and "crowning" frequently in pine thickets, and even in much larger stands, as for example the 40-foot stand in which it crossed the main highway. The intensity hardly diminished at all after nightfall, and everyone was pretty thoroughly worn out. The most will of course be made of the opportunity to study the effect of this fire, the history and intensity of which was thoroughly known by the local men. We at least have the satisfaction of knowing that we were prepared so far as fire lines were concerned, although as a matter of fact the fire came across the main road astraddle of the southeast fire line. Three fire engines from nearby towns obtained water from the upper lake, and helped to control the fire on the eastern side of the tract. Our men reported the back pumps to be very effective in "mopping up" on the following day, and we have ordered a supply for the Camp.

The full battery of weather instruments is now in place at Ockanickon. Unfortunately we do not have the humidity records during the period of the fire, but have a good record of precipitation for a month before the fire.

Forbes spent a couple of days in New York City, where he made contacts with the New York and Brooklyn Botanical Gardens, and arranged, he hopes, for the publication of an article on the forest experiment stations of the United States in a future issue of the Times. He talked on the work of the Station before the Directors of the Pennsylvania Forestry Association in Philadelphia, before the weekly soil seminar of the New Jersey Agricultural College at New Brunswick, and before the Pennsylvania Conservation Council at Johnstown. Under the leadership of Dr. Waksman,

the New Jersey Agricultural Experiment Station is doing considerable work of interest to foresters, and contemplates doing even more in the future. Dr. Waksman is making as his chief subject for investigation humus decomposition. He has had one man working all year on this project, and next year will have two men, both of them graduates of the Yale Forest School. He expressed dissatisfaction with the lack of continuity of most of the research being done at stations such as his own where men are working for a degree; he intends if possible in the future to have a continuous program of research on humus decomposition, and hopes that this subject will continue to attract men to study at New Brunswick under his guidance. This certainly offers a splendid opportunity for cooperation between the two experiment stations. Dr. Joffe showed Forbes an interesting installation of lysimeters in a coastal plain soil not far from the Experiment Station.

Forestation

The first reexamination of the Ockanickon plantations showed the white and red pine to be over 90 per cent in good condition, with the other species doing less well. The good condition of the white pine in spite of the severe drought of the spring is somewhat surprising. The rodent damage to jack pine does not appear to have continued.

Management

Hough and Forbes continued their analyses of the extensive survey data for 1928 and 1929. Hough evidently has material for two substantial articles, on the white pine type. Forbes will have one on the beech-birch-maple type. McComb began a study of the seedlings germinating from the chestnut oak acorns planted last fall at Ockanickon, all under screen. Those outside have completely disappeared.

Mensuration

Collaboration between the Station and the mathematics department of the University has unearthed some interesting, and we believe perhaps somewhat revolutionary, facts as to the importance of carrying out multiple correlation computations to a large number of places. Schnur, in the course of his work with converting factors, made up a test problem for solution by the ordinary methods of multiple correlation. To his surprise, this problem did not yield the original values assigned to the variables, and Professor Chambers of the mathematics department was asked what was wrong. After some difficulty he established the fact that the problems could be solved if they were carried out to about twice the number of decimal places that Schnur had used. It therefore became necessary to recompute the converting factor values previously obtained, in some instances starting with as many as thirty-two decimal places. These

recomputations changed the values attained in some instances, and Director Behre of the Northeastern Station, who happened by in time to see our results, suggested that this finding was of sufficient importance for publication in some statistical journal. We have accordingly undertaken to prepare such an article, with Dr. Chambers' help.

Morey completed a paper summarizing the results of the hypsometer test made at Camp Ockanickon last fall. Wood supplemented the data on diameter and height growth at Ockanickon by complete stem-analyses of a number of trees which he found it necessary to fell in the isolation of certain chestnut oak seed trees. Schnur and Morey became so impressed with the possibilities in the age counts of hemlock at Heart's Content that they have proposed we enlist the help of Dr. A. B. Douglass in the examination of several sections by individual year measurements, rather than by decade measurements. The question arises whether a species as tolerant as hemlock, and growing in a virgin stand where the trees are of all ages surrounding it, can be successfully studied from just a few specimens.

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APPALACHIAN FOREST EXPERIMENT STATION

General

The Appalachian Forest Research Council held its sixth meeting at Asheville, N. C., May 29 and 30. Ten members and 23 guests were present. In addition to the usual reports by the experiment station staff and the State foresters of the region, a number of special subjects were discussed. Colonel Joseph Hyde Pratt presented a summary of State and Federal forestry legislation during the past year. Mr. J. G. K. McClure, Jr., president of the Farmer's Federation of western North Carolina, described the work of the farm forest products department recently organized for cooperative marketing. R. C. Hall discussed the plans and methods used in the North Carolina tax study, while W. E. Bond told about the economic study now being conducted by the Southern Station. Dr. Thorndike Saville, professor of hydraulic and sanitary engineering at the University of North Carolina, gave a very interesting address on the relation of forest cover to streamflow, erosion, and sedimentation, describing the work now being done by his department on the Durham, N. C., city watershed. A. H. Howell and T. D. Burleigh discussed the work in forest biology that is under way in the region.

Between sessions two trips were made - an overnight trip to Pisgah Forest Inn, and a visit to the Biltmore Estate and mansion.

The Council adopted resultutions favoring studies of streamflow and erosion, added funds for protection of experimental forests, passage of the Englebright Bill, extension of the timber survey to the Appalachian region, increases in the personnel of federal cooperating agencies at the Appalachian Station, and additional work on the Coastal Plain. It was decided to appoint a committee of two Council members to receive semi-annual reports from the Station on the status of research results in preparation or awaiting publication.

Among the visitors in May, were Professor R. W. Hayes and sixteen forestry seniors at North Carolina State College. The party spent several days in the neighborhood of Asheville, visiting Bent Creek, the Biltmore Estate, and timber sales on the Pisgah National Forest. Two German forestry students, F. Gudden and A. Ebner, from the school at Munich, made their headquarters at Bent Creek for five days.

Korstian and MacKinney spent a few days with Bond, of the Southern Station, and Thompson, of the Taxation Inquiry, in Beaufort and Chatham Counties, North Carolina, to familiarize them with the Station's work on loblolly pine and assist in developing methods for determining growth over extensive areas. The study of taxation which Thompson made in Beaufort County under the direction of Professor Wager of the University of North Carolina, offered an excellent opportunity for Bond's study of the financial aspects of timber growing. Both agencies were able to use much the same information in their respective studies.

Fire Damage

Periodic observations of the controlled burning plots in the oak-pine type on the Bent Creek experimental forest were begun during the month. A severe burn was effected on these plots April 10, 1930, just prior to the opening of the buds. The nature and extent of the physical damage to the standing trees and reproduction will be studied during the coming summer. The influence of the fire upon soil conditions is being observed at regular intervals.

Efforts will be made to determine the extent of killing of the cambium on the hardwoods in the large diameter classes. Evidence of borings of ambrosia beetles, which are considered to attack the bole only where the cambium has been killed, serve as a convenient indication as to the extent of the fire damage to the bole. All reproduction under two inches d.b.h. has been killed. The buds on all the lower branches of the larger trees were killed by the heat. Sprouting is now taking place along the bole, in some cases to a height of 35 to 40 feet. The large pines suffered considerably in browning of the needles. The browned needles are now being shed.

Sprouting of the killed-back reproduction is very vigorous. Many thrifty small seedling sprouts are present. At the bases of the larger reproduction, and of large hardwoods where the cambium has been badly damaged, large clumps of sprouts are present.

Soil observations indicate that surface temperatures are now higher under the burned cover, due largely to the lack of shading. Analyses of further soil conditions have not been completed.

Loblolly Pine Study

The milacre quadrats on the selective logging plots at Franklin, Va. were examined to determine the amount of logging damage. On about twenty-five per cent of the quadrats all tree reproduction over one foot in height was tagged and individually described. The tree reproduction on all of the remaining quadrats was merely tallied.

The unmerchantable hardwoods on three and three-fourths acres were poisoned. The trees were ringed with single axe cuts into which sodium arsenite solution was introduced. Detailed time records were kept. It was found that when the time required for poisoning was plotted over D.B.H. a straight line resulted. Total cost of poisoning varied from $1.43 to $2.24 per acre where the hardwoods ranged from 217 to 305 per acre and from 2 to 18 inches in diameter, averaging about seven inches.

Water Requirements Study (Fp-4)

A study of the transpiration and water requirements of yellow poplar and chestnut oak was begun on a small scale at Bent Creek. Each of the species is being tested in two soils, the rich cove-bottom type and the dry stony ridge-top type. Only six potometers under each condition of species and soil are being used.

The potometers used are 13 inches in diameter by 17 inches deep and are sealed to prevent evaporation from the soil. The plants being used this year are wildlings taken up with the roots balled in earth. No wilting has been observed in any of the transplanted trees although they were in full leaf when taken up.

Bent Creek Experimental Forest

The map of the Bent Creek arboretum was revised to date, and blue prints made. The arboretum now contains about 70 plantings, most of which are doing fairly well.

For the accommodation of the summer field crews at Bent Creek six 10' x 12' tents are to be set up on semi-permanent foundations and floors. This and other work in preparation for the summer was started in May.

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CALIFORNIA FOREST EXPERIMENT STATION
APRIL AND MAY, 1930

Director Kotok continued his stay in Washington through the first three weeks of April, then went to Madison for a Fire Committee conference in advance of the Annual Research Program Conference. At the latter he was joined by Hill and Brundage. Kotok stayed for the first week of the Program Conference only, returning home to be in attendance at an important meeting of the so-called Hoover-Young Commission, or joint Federal-State Commission on Water Resources, meeting jointly with the State Legislative Committee on the same subject.

At this meeting a strong statement for the necessity of including a careful consideration of the relation of vegetative cover on watersheds to the water crop derivable from them was made by foresters and others representing the State and local chambers of commerce and other influential bodies. Among those thus appearing were former District Forester Geo. H. Cecil, now Executive-Secretary of the Los Angeles County Conservation Association and Chairman of the Conservation Department of the Los Angeles Chamber of Commerce; Dean Walter Mulford; H. S. Gilman, President, President of the San Dimas Water Company and member of the State Board of Forestry; and Francis Cuttle, Chairman of the Tri-Counties Reforestation Association. Director Kotok gave a presentation of the relation of the Experiment Station to this work and of the need for expansion of such work and its adequate financing in relation to the State and Federal water problem in California. This was supplemented by accounts of our work in detail by Lowdermilk and Kraebel.

The change in attitude and increased understanding of and sympathy with our forest influences work on the part of several influential engineers in the State, as the result of such get-together meetings as that of the Sonderegger Committee of the A. S. C. E., referred to in the report of this Station for March, and of personal contacts and explanations of our work to them in recent months, is most encouraging. Conspicuous among such "converts" are the present State Engineer, and the Chief of the State Division of Water Rights, the latter especially having formerly adhered to the common engineering prejudices against forest influences, and having even been a proponent of burning as a means of increasing water availability. With such key men now in sympathy with the forestry view

point, and the chairmanship of the Hoover-Young Commission in the hands of such an intelligent supporter as former Governor and Chairman of the State Board of Forestry, George C. Pardee, there seems to be real hope for a more constructive recognition than has ever been given in the past, of the forest influences phase in connection with water policies in this State. At the request of the Commission Kotok is preparing for them a brief on the present status of forest influences in relation to water conservation in this State.

On May 20, Kotok also participated in a meeting of the Sonderegger Committee looking to further coordination of the plans for research on the various phases of the water problem including forest influences, in this State. The prospect seems increasingly promising for constructive accomplishment in this undertaking, of which so many foresters in the State have been skeptical.

Management

Mr.

Hasel and Dunning made an early April trip to the Stanislaus Branch to examine the screened and unscreened plots seeded last fall. There is a critical period of a few days in early spring which appears to determine success or failure of many seedlings on clear-cut areas. Just as the snow disappears from the cleared areas the seeds begin to germinate. Three or four warm dry days with north and east winds result in death of practically all seedlings that have ruptured the seed coat. Such critical periods have occurred during each spring for the last three years. White fir suffers most under such conditions. On north and east exposures or in partly shaded locations fir germinates around the edges of melting snow-banks and is able to penetrate the soil before drying out. It seems probable that differences between the northeast and southwest exposures during these critical periods of early spring may go far to explain the predominance of fir in northeast exposures.

Western yellow pine seedlings one year old and 1-1/2 inches high were found to have roots penetrating the soil to depths of 18 to 20 inches. Very few laterals are formed the first year. It is evident that in the first season successful seedlings have roots reaching below the zone of excessive drouth and are in close competition with other perennial vegetation for the moisture in the deeper soil. The long roots of natural seedlings suggest the cause of failure of planted stock with roots pruned to 8 or 10 inches.

The cumulative effect of continued drought was shown in a striking way when dust dry soil was found 8 inches beneath the litter under a stand of fir in April - the end of the rainy season and beginning of the growing season.

Mc.

A new plot in virgin timber has just been established at the Stanislaus center. The stand and site are typical of a number of cut-over plots near by. The records are being adjusted to the same periods as the cut-over plots by boring each tree and establishing date of death for trees of considerable size which have been lost. The accurate determination of the date of death of each tree was fairly easy because of the nearly universal occurrence of scars from a fire of 1890.

The stanislaus Branch has become an active center this season with the management crew, consisting of Hasel, Agri, May, and Dunning, and Struble working on the white fir beetles. By the first of June Benedict's Blister Rust crew will probably be established there.

Pf.

April Dunning and May reexamined the California fire damage area burned over in 1920. This area is in the critical zone where chaparral and timber meet. After 10 years the outstanding features are the excessive increase of manzanita from seed in the margin of burned timber and the continued failure of tree seedlings. The portions of the burn formerly occupied by sprouting shrubs still has less inflammable material than surrounding unburned brush, but on the portions formerly partly timbered the accumulation of litter, dead material, and new seedling shrubs would probably produce a hotter summer fire than the original. Forage changes have been negligible. Losses in the timber have subsided to normal apparently.

Cover Types

In the office Mr. Clar has been compiling all of the type data so far secured on a mounted copy of the new U.S.G.S. base map of California scale 8 miles to the inch. This is an admirable base for the purpose showing drainages, county boundaries, and post offices. Within the timber belt a color legend is used to bring out three distinct land use zones which correspond very closely with climatic and fire hazard zones. These are (1) Zone of saw timber species only, (2) Zone of both saw timber and pulpwood species, and (3) Zone of pulpwood species only. The various timber types within these zones are segregated and indicated by letter symbols. This compilation will be valuable in giving a picture of what has been accomplished to date on the project and will assist in planning what is necessary to complete the map.

This field season a grazing reconnaissance crew on the Plumas National Forest will secure cover type data as well as grazing data. Mr. W. V. Benedict of the Blister Rust Control has worked out a plan with

Wieslander whereby their crews will secure data for a cover type map in connection with an intensive Ribes reconnaissance of 140,000 acres within the Eldorado National Forest this year. In the course of the regular work type maps are made in which brushfields and other nontimbered types are segregated from broad sugar pine types. In order to secure data to adapt their maps to our cover type classification they will record the type in the vicinity of two mechanically located sample plots which are taken within each 40 acre subdivision. This should give excellent data for our purpose.

Forest Influences

North Fork Run-off and Erosion Installation

The data on this installation are being worked up by Sundling and are showing interesting and unlooked for relationships. The melting of snow is shown to yield more surficial run-off than was expected in the Sierra Soil Series. Likewise melting snow yielded more run-off from the covered plots than did rainfall. Rain intensities varied, so-called steady rains appearing on the intensity record as made up of showers and lulls. The highest intensity in the spring rains was 2.4 inches per hour for a period of 10 minutes. And very significantly the surficial run-off factor progressively increased on the burned plots from less than one per cent to 31 per cent for the last spring rains. This condition calls for a further study to explain this progressively reduced absorptive capacity of the bare soils for rain.

The advantage of the multiple recorder has been fully demonstrated in the perfect synchoronization of the rain and run-off for all instruments. Plotting is done more rapidly and satisfactorily. Thus the feature of fundamental interest involving the direct correlation of intensity of rainfall to the minute if desired with rates of run-off from plots is clearly set forth in the plotting of these data. The graphs show:

1. Cumulative rainfall
2. Rate of rainfall by 5 minute intervals
3. Cumulative run-off
4. Rate of run-off by 5 minute intervals

It is possible to evaluate the comparative influence of a mantle of vegetation with a condition where the vegetation has been destroyed by whatever means.

Watershed Problems in Arizona

Lowdermilk represented the Station at Tucson, Arizona at the Conference on Wild Life, Forest and Range Problems, called by President H. L. Shantz, and at the meeting of the Southwestern Section of the A. A. A. S. Scientists from Oklahoma, Texas, Colorado, New Mexico, California, and Arizona were present at the meeting. Special attention was given to archaeology in the Southwest, to climatic and water problems, and to interrelations of fauna and flora in the arid regions of the United States.

Water problems in Arizona have not reached the critical situation obtaining in southern California. Underground sources of irrigation water have not been drawn on to such an extent that agricultural development has progressed beyond the annual accretion of storage during dry cycles. Surface storage of irrigation waters limits the development of agriculture more nearly to the annual supply than does the use of artesian and underground supplies of cyclic storage.

Watershed consciousness has not developed to a degree in Arizona that it has in southern California for a number of reasons, the most important, perhaps, being that forage, not water, receives first attention as a product from the mountainous areas below the timber zone.

Two excursions conducted under the auspices of the A. A. A. S. meeting were attended, namely, to the cactus forest and to the Santa Rita Range reserve. The importance of preserving areas of the so-called "desert" with its wide variety of flora and fauna as wilderness areas and research reserves needs recognition and emphasis. Particularly was the writer impressed by the exclosures at the Santa Rita Range Reserve, which is a research reserve of unusual interest and value. It seems of first importance to know what the present climate is capable of producing in vegetation undisturbed by other factors. The writer indicated a number of times that in China where use of the vegetation and land had been in operation for several millenia, there were better examples of the primeval mantle of vegetation preserved in temple forests than in the southwest where use began only a few decades ago.

Erosion in the Southwest

A fuller account of observations on erosion in Arizona is being prepared, and only a few points can be indicated here. The Tucson meeting made possible an interesting study of erosion phenomena from the desert, of the Papago country to the Grand Canyon, the masterpiece of erosion. Occasion was taken to study the Papago country along the highway in the light of Kirk Bryan's paper on "Erosion and Sedimentation in the Papago Country, Arizona", U.S.G.S. Bulletin 730-B, 1922.

The sharp angle between slopes in massive rock and in detrital or rain washed slopes is a conspicuous feature of the landscape. The development of desert pavement was found especially interesting. Desert pavement shows typical development in the Papago Desert, where rainfall is below 7 inches per annum, and where the moisture supply is insufficient to support a complete mantle of vegetation. Desert pavement was found to be a control of surface erosion functioning in a way equivalent to vegetation. Underneath the desert pavement was found fine textured soil, bespeaking the protection of the pavement. Desert pavement may be an evidence of climatic succession and deserves particular study in this relation.

The similarity of erosion pavement and desert pavement is very striking. Erosion pavement was found well developed in the Roosevelt Catchment area, in overgrazed areas, where the present climate is sufficient to support a complete mantle of vegetation, under which weathering of rock and soil formation can be expected to proceed certainly more rapidly than under pavement. The implications of erosion pavement suggest an important lead in studies of erosional phenomena.

The Roosevelt Catchment Area

The most impressive phenomenon exhibited on the Roosevelt Catchment area, in the granite formations was differential movement of eroded material. The small tributaries are filling up with material off the steeper slopes. The buried condition of shrubs in these drainage channels is the evidence for this condition. It is apparent that the run-off is insufficient to transport this accumulation out the larger drainage channels of lower gradient as rapidly as it is supplied from the steep side slopes. It seems very probable that with the recurrence of a wet cycle, when heavy run-off is produced this enormous accumulation will then be moved down the main drainages into the reservoir. That will then be a season of post-mortems.

Accelerated Erosion

Summarily this trip has emphasized the importance of defining and the experimental study of (1) geologic norms of erosion, and (2) accelerated erosion above such norms. Under the conditions of indiscriminate consumption of vegetation, by grazing, lumbering, and fires, the norm of natural undisturbed conditions disappears. And in the absence of it, little concept of the degree of acceleration of erosion and its attendant phenomenon of run-off is to be had. Thus the importance of enclosures of research reserves and other such areas representative of type localities becomes of fundamental importance in understanding which are the rates and trends of physiographic processes set in motion by the enlarged and intensive use of vegetative soil and water resources occasioned by rapid occupation and development of the arid region of the United States.

Southern California

Kraebel spent the latter part of the month at the Feather River Branch, putting in seedbeds with Borrow and planning the continuation of planting experiments started in 1928 and 1929. He made a trip to Susanville to examine the nursery and discuss problems with Supervisor Durbin and Nursery Superintendent Corson. Incense cedar on the Plumas Forest in the vicinity of Quincy shows the same death in the younger age classes that has been reported from other parts of the State. Examination in the field failed to discover any evidence of insect or fungous attack.

Products

Hill made a field trip to Harvey Valley on the Lassen Forest to make an insect infestation examination of the trees tapped for heptane in 1927 and 1928 with Entomologist John M. Miller. The results of this inspection have not yet been worked up, but so far as could be judged by impressions as the work progressed there seems to have been no concentration of Dendroctonus attack on the area tapped for heptane, more than on surrounding untapped areas. The cruise covered practically two entire sections, so as to get far enough outside the heptane area to secure dependable check.

Woods and Mill Study

When one is summarizing field data in the good old-fashioned way, viz., an item or two at a time with pencils, paper, and adding machine, he is enabled intermittently to prepare short articles or technical notes showing results of some particular phases of his researches, interesting and complete in themselves even though their bearing on the major problem under investigation cannot be foretold until all phases are correlated. He can do this because definite answers are continually accumulating - specific end results of completed computations covering definite segregations of field data. Under such conditions one can, and should, issue brief articles for public consumption or for the information of his brother researchers. Certainly they are ideal material for our Monthly Reports and it is exactly that type of articles which now constitute a considerable portion of the text in each of these mimeographed compendia of branch activities.

Consider now the latest improved method of making your data do squads right, squads left, about face and other maneuvers, all in double quick time - that intricate card shuffling and tabulating Rebot known as the Hollerith machine. Suppose your field work is finished and all you have to do is hand over the forms to the punch card operator. In a remarkably short time an assortment of summaries literally rolls back to you all ready for setting-up exercises on the slide rule or for copying into tables, or both, and a final report is soon taking form so rapidly that piecemeal progress

notes are almost eliminated. This is the ideal of efficiency, of course, but can be attained only when you have your own Robot at your elbow and when your field data are ready for punching "as is", i. e., as recorded in the field without further computing or manual correlation.

Finally, consider a project which is eventually to be juggled by the Hollerith but which, before carding can be started, must undergo several months of preliminary computing, checking, correlating, and adjusting (the long period due to the smallness of the force available in comparison with the size of the job), with not a solitary bit of the work yielding any information whatever of "Technical Note" availability, just a daily grind of figuring and writing down the figures to be duplicated later in the shape of small, rectangular holes (something over two million of them) in sixty thousand cards. Such is the Pickering Lumber Company's woods and mill project.

This explains why we still have no information of value to offer on the economies of lumbering in the California pine region - why the flow of literature on this project has been less than a trickle. The depreciation forms (25000 cards) are now in Madison, and have been there for about a month awaiting an opening in the Laboratory's heavy card punching schedule, and the mill study forms (35000 cards) are at last nearing completion so that they can also go forward within a couple of weeks.

A large part of the labor that has been necessary to put these data in proper shape for carding can be eliminated in the next study. Brundage has in mind an entirely new set up of forms and a different type of crew organization.

Lumber Stain Study

The field forms for this project were taken from the shelf, where they have reposed since last June, a card was designed, codes were formulated, and the data partially overhauled for punching. Brundage will complete the job while at Madison and it is hoped the information can be summarized in time to publish at least one instalment of the final report before the end of the year.

Somewhere in the neighborhood of 27000 field forms and 1200 tree data index cards have been correlated, computed, summarized, checked, double checked, and coded for the punch cards. These are for the tree-saw-mill-green lumber tally tie-up only and do not include woods operations, railroad haul, check on green chain grading or depreciation between mill and car. Of the original field forms, only those showing the green chain tally summarized by grade-thickness-width groups were sent to Madison. All other data were condensed in code form on letter size sheets, one line to a log. By this procedure it has been possible to cut down the total number of forms to

be handled by the punch card operators from 28000 to less than 9000. The last shipment of these forms reached the Laboratory computing section on May 26. About one third of the cards has already been punched.

Depreciation Study

The cards for the green grade check and degrade study section of the Pickering Lumber Company project have been punched and verified and the first summary sheet has just come from the tabulating machine. This first run is confined to a pile analysis and will show the volume degraded for each original grade in each yard pile and kiln test, the volume lost or salvaged for moulding in remanufacture, and a detailed perspective of the lengths, width, and grades constituting each drying unit. Since information on only two similar piles is available at the moment, it is impossible to give any general comparative results as influenced by piling practice. The western yellow pine 5/4 selects which have been tabulated show the following degrade on a piece basis:

Clear	8%
C Select	17%
D Select	21%
#3 Clear	No degrade

The degrade for all grades combined is 10 per cent. Loss in remanufacture is less than 1 per cent, with slightly over 1 per cent salvaged for moulding. The value of the degrade and the volume restored to or raised in grade by further ripping and trimming are not shown in this analysis. These items will be handled on a total grade lot basis instead of a pile basis.

Lumber Stain Project

All field forms are in Madison, where Brundage is giving them the finishing touches preparatory to carding.

There are a variety of stains on sugar pine lumber - brown, green, yellow, orange and what not - but it is noticeable in checking over the field forms that stains other than the so-called blue varieties rarely cause degrade by themselves. Combinations of blue and brown stain, blue sap and orange heart stain, blue sap and heart sticker stain, etc., however, do cause considerable reduction in value when either one alone would not affect the original green grade.

Lumber Census

Satisfactory progress is being made with the lumber census for California. On May 1 approximately 70 per cent of both the sawmill and split products operators have made returns. Particularly gratifying is the fact that

returns from all but one of the major operators in the State have now been received. Third requests are now being prepared for the delinquents. There has been somewhat of an improvement in the prompt filing of returns as compared with the response received in previous years. Possibly this has resulted from the widespread publicity given to the activities of the Bureau of the Census this year in behalf of the decennial population count, although we feel that another not negligible factor is that the first requests were not mailed until about the middle of February. By that date most of the operators had completed their yearly inventory rush and were in a position to make their returns promptly. This has made possible more efficient editing and a saving in the number of second and subsequent requests.

The following shows the status of the inquiries:

	Sawmills-1929
Initial mailing list	422
Second requests	215 (50%)
Third requests	101 (23%)

Entomology

Aside from two short trips April was spent in completing reports on the 1929 field studies and in preparing plans and equipment for the 1930 season. Person completed a preliminary report on the Sugar Hill fire study and Struble one on his nutritional study with the western pine beetle.

Early in April Struble and Person made a trip to the Sequoia National Park at the request of Superintendent White to study the insect conditions in Paradise Creek basin and to assist in a small control operation. The western pine beetle outbreak there, which was probably due to deficient soil moisture, was complicated by the work of buprestids, engraver beetles as well as needle and twig insects. Struble has prepared a report on the conditions found.

During the third week of April Person and Wagener made a trip to Hackamore, on the Modoc National Forest, to decide on the best location for a field base for the coming season, and also to get further information in regard to the progress of the Pickering operation on the Badger Springs area. Because of the lack of development in this area it was decided to delay the building of the camp at Hackamore until later in the season.

The field season began in earnest early in May when Jeffrey and Wagener left for Buck Creek in the North Warner Mountains. Jeffrey will remain at Buck Creek for the summer where he will continue studies begun last season on the effect of rate of growth and different types of injury on the concentration of certain sugars, in the inner bark of western yellow pine and the relation to the attraction of the western pine beetle.

Wagener remained at Buck Creek for a few days to assist Jeffrey and then left for the Devil's Garden extermination area where he was joined later by Bacon, Durbrow and Person. Durbrow, a recent graduate, and Bacon, a senior of the School of Forestry at the University of California, will assist with the studies in the Modoc area this season. The timbered part of the Devil's Garden experimental area was carefully cruised and all infested trees were treated. The area was also mapped and the distances to the nearest outlying bodies of yellow pine were determined. Although it was found that the area is not as completely isolated from other stands of western yellow pine as was hoped, the experiment will be continued to determine whether extermination is possible under the conditions found.

The last of the month was spent at Buck Creek where Durbrow has been assisting Jeffrey in his chemical studies, and Bacon, Wagener, and Person examined the trees in the fire study plots and did a little general cruising. Mr. Reinecke kindly had an Ames dial micrometer fixed up for our use as a dendrometer and screws and screw-hooks were installed on seven trees to determine the growth rate of two check trees and five injured trees used in Jeffrey's chemical studies. Two of the trees were girdled, one shallow and the other deep, one was crown pruned, one root pruned and the other injured by fire. Studies on the relation of hydrogen-ion concentration in inner bark to the attractiveness of different types of trees were also begun. A portable set for the electric determination of pH by the Quinhydrone method was borrowed for the season from the division of entomology of the University of California and will be used as a check on the colorimetric method used last season.

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CENTRAL STATES FOREST EXPERIMENT STATION

Research Council

We regret to announce the loss to our Council of Joseph E. Pfleuger who died at his home in Akron, Ohio early in the month. Mr. Pfleuger's support to the Council was very valuable because he represented the interests of the Isaac Walton League.

The Central States Forest Research Council met in Louisville, Kentucky, May 9. Eleven members and ten guests attented. The meeting gave opportunity for attendance of members from the western part of the region who previously found travel to Columbus difficult. E. E. Pershall of St. Louis, Missouri, who presided at the meeting, was elected Chairman and Tom L. Wheeler of Huntington, Indiana, Vice Chairman. St. Louis was selected as the next meeting place. Studies of Yield in All-aged Forest, Erosion and Fire Damage were urged by the Council as soon as funds are available.

The Council recommended completion of studies now under way, especially those of Grazing in Relation to the Farm Woodlot and Yield in the Older Plantations. The work of the year will complete a stage in each of these projects which will permit publication of results.

At an informal meeting on the evening of May 9, the advisability of calling a forestry congress for the Central States Region was discussed. The sentiment of the meeting was very favorable to such an undertaking since there is a feeling that greater unity of forestry effort is needed in the hardwood region. As a result of this meeting a committee was formed with E. Murray Bruner as Chairman to further steps in the promotion of a meeting leading to a forestry congress.

On the morning of May 10 the group assembled for the Council meeting were guests of State Forester Wilcox, who conducted a trip over the Clark County State Forest near Henryville, Indiana. This trip included an inspection of the Indiana State Nursery, which is growing rapidly in size to keep pace with the demand for forest planting stock in the state. An examination was also made of the many planting experiments established by the State Forester and three experimental plots laid out in a cooperative study between the Commission of Conservation of Indiana and the Central States Forest Experiment Station.

Liability Insurance

Arrangements were made through the Travelers Insurance Company by which an automobile liability and property damage policy has been issued in the name of the Director covering three government-owned automobiles. Temporary employees driving these cars will be protected under this policy provided they are definitely authorized to drive them. This authorization will be covered by a letter to each individual who will have the responsibility of driving the government cars. Cost of the policy amounts to $44.64 for a four month's period. The cost will be distributed among the staff and temporary employees.

Woodland Grazing (Pa-1)

Arrangements were completed during the past month for cooperative assistance furnished by the State Agricultural Experiment Station of Purdue in this project. One member of the forestry staff of the Purdue Station will work through the summer with our field parties. State Forester Wilcox has given very cordial assistance in this project by furnishing a list of woodlots classified under the tax law where grazing has been eliminated from the classified woods. Day will take advantage of this opportunity to study the recovery of grazed woodlands after the removal of stock.

Plantation Study (Fp-1)

Sprouting of Plantation Yellow Poplar

The remeasurements from a sample plot in planted yellow poplar have been summarized by Kellogg. This plot was established to trace the sprouting of the poplar as well as to collect data on the reaction of this species when planted on old fields. The plantation is now four years old from 1-0 stock. During the year, the average height has increased from 2.2 feet in 1929 to 2.6 feet. All the volunteer native species show higher average heights than the poplar. It was found that rodent (rabbit) damage to the poplar which was very severe in 1928 and which resulted in a large number of "limb leaders" has greatly diminished, so that only about one per cent of the trees now show damage from this cause. Sassafrass, however, shows 20.5 per cent of the trees with tip damage, 5.3 per cent with injured side limbs and 2.7 per cent with the stems gnawed.

Greenbrier was found to be rapidly climbing on all tree growth so that about 25 per cent of the yellow poplar, 13.5 per cent of the sassafrass and 11.3 per cent of the persimmon were burdened with the vines. The analysis shows that the position of the poplars is much better than a year ago and that about 65 per cent of the trees are now free and above competing herbaceous weedy vegetation.

Analysis of the Original Planted Yellow Poplar on Sample Plot No. 2
- Second Measurement -
1930
Hay Hollow, Pike County, Ohio
Age - 4 years. Area - 0.491 Acre

Class of Trees	Total	D.B.H.	Average Height	Position: Free	Position: Int.	Position: Overt.	Showing Sprouts	Mortality
	Number	Inches	Feet	%	%	%	%	%
Seedlings	47	0.3*	2.3	50.0	30.4	19.6	26.1	2.1
Seedling Sprouts	57	0.1**	2.5	51.8	33.9	14.3	15.8	1.8
Limb Leaders	212	0.1x	2.7	72.3	16.2	11.5	17.7	1.4
All	316	0.2	2.6	65.8	20.5	13.7	18.9	1.9

*Average of 2 trees which had reached B.H.
** " " 2 " " " " "
x " " 11 " " " " "

Kellogg found that almost 19 per cent of the yellow poplar trees show basal sprouts and that a larger percentage of the seedlings have sprouted than of the original seedling sprouts and limbleaders. It was further found that 2.1 per cent of the original seedlings have died whereas only 1.8 per cent of the seedling sprouts and 1.4 per cent of the limb leaders have succumbed. Growth in height for the year has varied from 0.0 to 1.8 feet. The mode is 0.4 feet. The number of trees showing diameter at breast height has increased from one to fifteen. An analysis of trees which produced sprouts showed that on the average, such trees grew only 0.2 feet in the year and that the average height growth of the sprouts was 1.7 feet.

Analysis of Sprouts from Yellow Poplar Planted April 1926
- 1930 -
Hay Hollow, Pike County, Ohio
Area - 0.491 Acre

Class of Trees Being Observed	Basis	Av. Height of Tree Bearing New Sprouts 1929	Av. Height of Tree Bearing New Sprouts 1930	Total Number of Sprouts	Av. Hts. of Sprouts 1930	Position of Sprouts Free	Int.	Overtop
	No.	Feet	Feet	- No. -	Feet	%	%	%
Seedlings	12	1.9	2.1	20	1.9	20.0	35.0	45.0
Seedling Sprouts	9	2.2	2.6	12	1.2	0.0	41.6	58.4
Limb Leaders	37	2.2	2.3	57	1.8	24.6	33.3	42.1
All	58	2.2	2.4	89	1.7	20.2	34.8	45.0

In some cases the sprout's growth in height for one year exceeded the parent tree's total height.

Leaf Bud Arrangement on American Elm Seedlings

Mr. A. G. Chapman is experimenting on American elm (Ulmus Americana) seedlings, among other species, in the Botany Department at Ohio State University. Part of his 1-0 seedlings show opposite bud arrangement (and therefore leaf arrangement during the first year) and the shoots which are appearing are oppositely placed but bear alternate leaves. The remaining seedlings show alternate buds, leaves, and shoots. He and Kellogg measured and tallied the elm seedlings and found that about two thirds of them show this opposite leaf-bud-shoot arrangement for the first year. The stock was produced at Wooster, Ohio. It is not known whether the seedlings came from one or two parent trees.

Oak Yield Study (TS-12)

Considerable progress was made on the tabulating of oak yield plot data in preparation for punching on cards. Barrett worked on the computation of data collected at Henryville, Indiana in connection with the studies of yield in the mixed all aged forest.

A collection of all available volume alinement charts for Central Hardwood species was made and our file of this material is now complete as far as this work has been computed.

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NORTHEASTERN FOREST EXPERIMENT STATION

At the request of Finch, Pruyn and Company Behre and Westveld spent a few days in northern New York selecting a location and laying plans for an extensive series of methods of cutting experiments in the spruce flat type. Foresters of the Finch, Pruyn and Company have come to the conclusion that a short cutting cycle of 20 to 25 years is desirable and practicable on the more accessible areas tributary to the drivable streams in order to utilize the growth of balsam which deteriorates rapidly if allowed to remain much longer between cuttings. A series of five plots of about 30 acres each will be laid out near Newcomb, New York, on an area cut over for pulpwood about 40 years ago. Three of these plots will be given selective cutting of different intensities. On a fourth the hardwoods will be girdled several years in advance of cutting of the softwoods, and the fifth will be retained as a check. 100% tally of all the trees over 4.5" in diameter will be made on this tract before and after cutting, by the Company, and the trees of smaller size and seedlings will be tallied on a portion of the area by the Experiment Station with possible cooperation from the Department of Forestry of Cornell University.

It is interesting to note that the standard practice of Finch, Pruyn and Company includes a 100% tally of all areas at the time of marking for cutting with an individual estimate of cull for each tree.

This experiment fits in admirably with Westveld's method of cutting project and affords a rare opportunity for the work. The area selected lies along the upper Hudson River, so that a cutting of almost any quantity of wood, no matter how small, will be practicable at any time during the life of the experiment.

Stickel made a trip to northern Maine to open the fire weather station at Smyrna Mills. Jenson has been busy throughout the month remeasuring permanent sample plots in southern New England.

The last week of May a group from the Station inspected a number of the old plots in New Hampshire and Maine established for the study of the control of the gipsy moth by forest management in 1914 and 1915, and also to inspect the silvicultural plots at Corbin Park, N. H., established in 1905 which are to be remeasured this year. The party included Behre, Spaulding, MacAloney, and Jensen of the Station staff, and I. T. Guild of the Gipsy Moth Laboratories.

The white pine blister rust was found in several of the young pine stands established on the gipsy moth plots and a number of other interesting pathological and entomological facts were brought out on the various plots.

MacAloney has returned to Amherst and reports negative results so far in his efforts to find a bait which would attract the white pine weevil. He has tried a large number of the commercial pine oils without success, but will continue his work along this line with other materials.

NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

The demonstration value of concentrated experiments and permanent sample plots at Branch Centers was emphasized strongly at the Priest River Branch. The junior class from the University of Idaho School of Forestry, numbering 23 men, and accompanied by two professors, Kempff and Nettleton, arrived at the Priest River Station May 25 for their annual spring field trip of two weeks. This is the fourth annual trip of this sort by the Idaho School of Forestry, and the field session at the Experiment Station is now regarded as a regular feature of curriculum work. The purpose is to observe a variety of forest research activities in progress and to learn by actual practice the technique used in studying methods of cutting and thinning, yield, natural reproduction, forest inflammability, etc. With a considerable number of permanent sample plots and regular measurement stations of weather and inflammability located within easy walking distance of headquarters buildings, class work is conducted systematically to familiarize the students with (1) the experiments under way, (2) the methods used, and (3) the results being obtained. Each student is expected to present a written report to the faculty showing the facts observed. As Kempff is thoroughly familiar with the work under way at Priest River it was not necessary this year for any of the Station staff to make a special trip in order to act as guide, and Gisborne, who was there in the course of his regular work, gave but one day to the explanation of research organization, methods and individual experiments. In addition to sample plot work the students are given several days' work on transect studies of reproduction on burns and old timber sale cuttings. They also spend a day or two on

active timber sales going through the steps of marking, slash disposal and inspection.

During the last week of May Professor F. G. Clark and eight members of the senior class in forestry from Montana also visited the Station for one day. This group was making a 1200-mile tour by auto, seeing as many types of forest, logging operations, sawmilling, etc. as possible. With only one day scheduled for stopping at Priest River, it would have been impossible for them to have obtained a reasonably complete picture of the Station work if the plots had not been located as they are. Several students expressed the opinion, at the conclusion of the trip, that this day at the Priest River Center was the most instructive and valuable day of the entire tour. They also recommended that in the future the trip be taken before the junior forester examination, because there were many facts learned, especially at Priest River, which would have helped them in taking this examination.

Walter H. Meyer, of the Pacific Northwest Experiment Station, also visited the Priest River Station for half a day and was shown as many of the experiments as possible in that short time.

The three new weather and inflammability stations, on clear cut, half cut, and full timbered areas, at Priest River were put in operation late in May by Gisborne. In the course of this work several problems were encountered which may have been solved at other Experiment Stations or may be met when such work is commenced. One of these is where to measure rainfall and fuel moisture contents under half or full timbered canopies. For example, should the rain gauge be installed directly under an opening in the canopy, directly under the drip from the edge of a tree crown, or closer to the tree trunk and decidedly shielded from vertical rainfall? At present each rain gauge and duff hygrometer is installed directly under an opening in the canopy, but this opening is much smaller on the full timbered area, larger on the half timbered, and is, of course, complete on the clear cut area.

A second problem concerned the elevation above ground at which the anemometer should be placed on each site, for the measurement of wind velocity. The instruments have been placed at about six feet above ground, in order to compare their records with those from the anemometer at the control station which has been operated at this height for a period of 18 years. Admittedly, however, if the primary interest were in the closest possible correlation of wind velocity with evaporation of moisture from the fuels on the ground, or the wind velocity effective in influencing the rate of spread of a ground fire, then the anemometers probably should be closer to the ground, perhaps at an elevation of only one or two feet.

A warning concerning the comparability of the old style 4-cup anemometers may not be amiss to other stations using and comparing results from several such instruments. Ranger Thompson believed that the anemometers

to be used at the three inflammability stations should be compared before being installed. The results of the first two days' test show that, especially with low wind velocities, there may be a very significant instrumental error. Four instruments mounted about 3 feet apart on a level stand showed average velocities per hour from 0.9 to 1.5 miles during the first 48 hour run. This 66% greater velocity shown by one anemometer compared to another could be attributed only to less friction and easier running in one case and more friction and greater inertia in the other. Apparently it is decidedly necessary to compare all anemometers of this type if reasonable accuracy is desired.

If funds are obtainable it is planned to install recording duff and air thermographs at each of these three inflammability stations. Previous measurements with ordinary maximum thermometers have shown extremely important differences in the surface temperatures of duff under different degrees of shade. Naturally this affects rate of evaporation of moisture from the fuels and from the soil and an attempt is to be made to ascertain more accurately the moisture benefits to be obtained as a result of leaving some canopy merely for its shading effect. Gasts' measurements of the effects of artificial shade have shown that this is an important factor not only in reducing inflammability but also perhaps in aiding seedling survival where soil moisture approaches a critical condition.

Haig terminated office work at the end of the month preparatory to starting the annual field activities of examining permanent reproduction and methods of cutting plots. He was able to finish in draft form his white pine yield report for Departmental publication. It is planned to go over this during the summer and have it ready for revision as the first piece of office work to be undertaken by Haig in the fall.

Comments on Weidman's timber growing manuscript by about a half dozen reviewers in the Regional Forester's office at Portland came on the last day of May. The manuscript had been gone three months. Weidman intends to take up promptly revision as suggested by these comments. From a preliminary reading of the remarks of the various reviewers, it is plain that revision is going to be more of a job than originally contemplated and may even necessitate a trip to Portland in order effectively to harmonize viewpoints and get more complete statements on certain specific items.

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General

Munger had over two weeks of leave in the East after the Madison meeting and returned to the Station May 27. On the way west he stopped a day in St. Paul to interview the Northern Pacific Railroad Land Commissioner and spent the afternoon and evening very enjoyably with Zon, seeing the splendid ample quarters of the Lake States Station and hearing of some of the interesting work.

Mensuration

During the coming field season the growth study in western yellow pine will be extended to Eastern Washington. Several field seasons in Central and Eastern Oregon have resulted in the accumulation of large amounts of data, but the conditions as found in Washington are so strikingly different that an independent mass of information will have to be gathered for this region to serve as a check upon the Oregon growth data. In order to anticipate the amount of work and the location of the best areas, Meyer spent several weeks in late May on a reconnoitering trip.

During this trip through the whole yellow pine region of Washington, vivid impressions were obtained of the unusual effect of the protracted dry spell, of which there has been so much talk. The dry spell has been a factor of concern not only to those studying growth trends, but also to the entomologists for the effect upon insect epidemics and to the water storage experts for the effect upon water supply in irrigation and power projects. The opinion of some observers is that the dry spell has reached its minimum and that precipitation is on the upward trend. But if the condition of the trees, especially in the fringe timber or border stands be studied, it will be quickly observed that timber is probably at its worst. The lack of annual precipitation is reflected in the gradual browning of the foliage during the winter, so that by the time the growing season starts, the needles and many buds are totally dead. In some critical areas fifty per cent or more of the trees are completely browned. Some of the trees will "green up" during the summer but others are indubitably dead. Reproduction, young bull pine, mature and over mature trees all can be affected. Since this is the second winter that such damage has occurred, a considerable reduction in the stocking of the affected stand can be expected. It is just another one of those factors which keep the yellow pine stands understocked. That trees of all ages, some existing for centuries, can be killed out by exceptional dry periods which apparently reoccur at varying intervals is an unavoidable catastrophe. The effect of fire upon stocking can be controlled to a certain extent. The effect of insects upon stocking can be partially eliminated, but no practical measure can be taken to alleviate the stresses of long dry spells.

Natural Reproduction of Douglas Fir

The early part of the month Isaac was at the Wind River Field Station starting the germination tests and making the first examination of the various groups of natural reproduction plots located in the valley. The measurement of physical factors was put this year on a weekly basis. Germination on seeded plots was abundant and somewhat earlier than usual and the seedlings suffered some from the late frosts. These frosts were severe enough to kill back the native bracken fern that had attained a height of ten inches.

This season a new enemy of the tiny seedling has put in an appearance. When germination was well under way, the screens were removed and within a period of two or three days practically all seedlings were destroyed on one area. Traps were put out and the white-footed (field) mouse was found to be doing most of the damage. "Live" traps constructed so they could be placed over groups of seedlings, the seedlings functioning as the only bait, definitely established the cause of loss. It has long been known that mice consume much seed but such wholesale destruction of seedlings is new to us. The area has now been poisoned and the plots reseeded in order to obtain seedlings to work with.

The groups of germination and survival plots located in the lower Columbia region of Oregon were given their first examination of the season. In the vicinity of some of these plot groups, there was a light seed crop during 1929 and on these plots some 1929 germination was found.

Wind River

Simson spent much of the month in completing the design, calibrating and construction of the five static meters which are to be placed in the central dispatchers' offices on five of the national forests of this Region.

On the 12th he went to an area near Zig-Zag R.S. and took part in a series of tests of snag boring equipment, principally drills and power plants. The outstanding piece of machinery was the 1 k.w. electric generator unit built and furnished by the Westinghouse Electric.

On the night of the 26th, Professor J. L. Alexander and 26 forestry students from the University of Washington arrived. They spent two full days studying the Nursery and the Branch Experiment Station activities under the guidance of Simson and Isaac, leaving the morning of the 29th.

Methods of Cutting in Western Yellow Pine

During the past month Kolbe divided his time about equally between field and office work on this project. All the plots on the Deschutes and Crater Forests were examined and 50 photographs were taken showing conditions after cutting on several of the areas. It is noteworthy that several new wind-falls were again recorded for the Crater "Seed tree Cutting" plot while none occurred on an adjoining plot which was selectively cut. In the two years since cutting, five trees have fallen on the area, ranging from 10 to 36 inches in diameter. The loss in volume amounts to about 600 cubic feet which is 8 per cent of the total volume in the trees left. In addition to the loss on the plot, three trees (22, 26 and 32 inches D.B.H.- 575 cu.ft.) were lost in the isolation strip that surrounds the plot. All the trees blown down were long crowned and thrifty.

The year of 1929, besides being a bad fire year, was most unfavorable to yellow pine growth and reproduction.

Throughout the central Oregon country and also in other parts of the State and Washington, a noticeable number of trees, both large and small, have died of drought, others have had much of their foliage blighted by dry winds. Weather conditions were so dry until late in the winter, that no suitable time was found on some sale areas to burn slash, which left on the ground for a second year is a real fire hazard. As a result of the drought, no 1929 germinated seedlings were found alive on the reproduction transects examined this spring.

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The Regional Races of Western Yellow Pine plantation on the Deschutes Forest was examined late in May before growth had started. The results of this examination as to per cent survival for the plot is now 38.6. Last autumn it was 54.2 and a year ago it was 56.3 which may be evidence that more planted trees die in winter than during the growing season.

Forest Survey

The Forest Survey was increased May 13 by the addition of Assistant Forester W. H. Bolles by transfer from District 4 and May 23 by the addition of Assistant Forester P. D. Komp by transfer from District 2.

Considerable time has been spent on the preparation of detailed administrative working plans and the development of field technique necessary to determine the cover condition of cut-over lands.

One hundred and twenty-two miles of sample strip has been run by Brieglieb and Buell through the agricultural areas of the Willamette Valley. Results of this survey show that in this region of intensified agri-

culture from 10 to 20 per cent of the area remains in some form of forest cover and less than 75 per cent of the area is actually tilled.

Excellent progress has been made in gathering cruise information from private timber owners. A comparison has been made of timber cruise value of private and county records for 23,000 acres in Tillamook County, involving nearly two billion feet of timber. The county cruise showed Douglas fir 12 per cent high and hemlock 30 per cent low as compared to the private cruise which was made by one of the leading cruising firms on the Pacific Coast.

Granger, Munger, and Andrews have spent some time with Mr. Hartman of the Bureau of Agricultural Economics, considering the question of land classification and land use in light of future drain on forest areas for agricultural purposes.

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SOUTHERN FOREST EXPERIMENT STATION

May brought the end of the monthly weighings of wooden blocks in five New Orleans houses, the Station's contribution to the Laboratory's study of moisture contents of wood in use. The series has continued more than a year, and we understand unofficially from the Laboratory that our blocks have been hanging in the wettest city and some of them in the wettest individual house of any studied in the United States.

The last of April and early May were marked by a severe drought in Louisiana and Mississippi. During the latter part of May there were floods in northwestern Louisiana.

Near the end of the month Pessin spoke twice before classes at Mississippi A. and M. College at Starkeville, once on general Forestry and once on Natural Regeneration of Southern Pine. Wyman addressed a joint meeting of the Georgia Forestry Association and the Georgia Commercial Forestry Conference at Savannah on High Returns from the Turpentine Woods. Wakeley broadcast from Station WWL on Silviculture and Forest Planting.

Fire

Pessin and Craig took numerous soil penetrometer readings in burned and unburned plots at Urania, using the instrument loaned by the Appalachi Station. They found little difference in penetrability of the soil in burned areas and areas burned only once (in the fall of 1928) in the

Forest, but on the Roberts Plots, where the burned plot has been subjected to annual fires for 15 years, the instrument showed about 66% greater penetrability on the unburned plot. The penetrometer studies were continued at McNeill, taking four hundred readings apiece on the burned-and-grazed, burned-and-ungrazed, unburned-and-grazed, and unburned-and-ungrazed portions of the pasture.

At the Starke Branch trees on the Raiford fire plots had been chipped nine times by the end of the month. Slightly more gum was obtained from the trees on the burned than from those on the unburned plot, but it is as yet too early to tell whether the same relationship will hold throughout the season.

Management

Pessin, Chapman, and Craig completed seedling counts on the reproduction quadrats at Urania and Monroe, and Pessin and Craig began the spring counts on the grazing and burning quadrats at McNeill. Pessin attributes the heavy mortality of the 1928 loblolly seedlings at Urania to the 1929 drought, and the death of longleaf seedlings from the 1929 crop, at both Urania and McNeill, to the unusually cold weather last winter.

At McNeill, Pessin and Craig cleared the vegetation from selected areas in the burned and unburned plots and plowed the land preparatory to sowing corn, in an application of the phytometer method to measure the effect of burning on soil fertility.

Bennett spent part of his time on the Choctawhatchee studying the effect of scrub oak on natural reproduction of longleaf pine, concluding, as Shivery was inclined to do in 1925, that the oak acts as a nurse-tree to the pine and is eventually overtopped by it.

Averell worked for a week or two on thinning plots and during the month prepared an establishment report and working plan of the turpentine thinning plots at Kingsley Lake.

Naval Stores

Harper and Averell spent several days working up stem analyses of turpentined and round trees cut a year ago on extensive surveys (NS-4). A casual check of the results indicates very slight differences in the width of rings before and during turpentining. A few trees which had been worked several years prior to cutting and then had rested for some four or five years showed some decrease in growth during the turpentining period as compared with the pre-chipping growth, but the trees recovered and made just about as much growth during the resting period following turpentining as they had made before chipping started. More data are needed to check this result.

Forestation

The individual tree heights and injury notes taken the past three years in the Bogalusa plantations have been punched on cards and listed for correction, together with the notes for 1926 and 1927. The lists have been returned to New Orleans for checking. Wakeley spent about half the month on preliminary analyses of the first two years' data on 3,000 trees in the slash pine spacing plantations and 2,000 trees in the longleaf pine spacing plantations, preparatory to drawing up punch-card sorting directions for the sixty-three experimental plantations at Bogalusa.

Erosion

The erosion crew spent a few days in Wilkinson County, Mississippi, finished their report on Carroll County and revised the Jefferson County and Lafayette County reports, and started laying plans for more detailed studies of run-off and erosion on limited areas.

Economics

Bond spent the period from May 1 to 26 in field work in Beaufort County, N. C., cooperating with the Forest Taxation Inquiry in a study of the financial aspect of growing loblolly pine. He took case-study data on individual mills, gathered tax data at the county seat, and studied intensively selected areas in the woods.

Spillers spent the month with Forest Assistant Coulter of the Florida Forest Service in Washington County, Florida, working on the financial aspect of growing longleaf pine. Dr. Ziegler joined them May 13. They found 40% of the county in the sandhill region, with 50,000 acres of the deep sands already reverted to the state for taxes. Taxes were 20¢ to 40¢ an acre for forest land, 100% to almost 200% higher than the taxes on similar land studied in Georgia, Alabama, and Mississippi. Because of fires, the net income per acre of forest land was lower than in most of the counties studied in other states, and the turpentine timber had been overworked.

Pathology

Siggers sprayed the brown-spot plots in the South Pasture of the Great Southern Lumber Company at Bogalusa in the middle of May.

In order to determine the rate of development of brown spot needle blight on longleaf foliage, a series of plots had been laid out and Bordeaux mixture applied at definite intervals between April 17 and September 4, 1929. A study of the 1929 foliage showed that the disease started slowly in April and May, that its rate of development accelerated in June and July, followed by a decrease in rate during the latter part of August.

In connection with the study of butt-rot in southern pines, caused by Polyporus schweinitzii, an attempt is being made to establish a relation between vertical extent of decay and its basal diameter. About 200 cultures were made during May to determine the presence of Polyporus schweinitzii rot in the upper parts of basal logs.

Lindgren and Scheffer took down preliminary small scale tests of various dips at three mills, and on the basis of the fairly consistent success of several blue stain preventives, have entered negotiations with five mills for the setting up of large scale tests of these chemicals, on both pine and hardwoods, during the course of the summer. They also took preliminary notes on their first log coating treatments to prevent blue stain in the woods.

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R-2 Research

May Activities

Roeser returned from the general research conference in Madison on May 9, and immediately undertook the task of completing the spring planting and transplanting program, involving Douglas fir and western yellow pine trees respectively in the heredity phase of the source of seed tests. The work was facilitated by the cool wet weather which prevailed in the Pikes Peak region during May.

Sample trees from the 2-0 Fremont lots being raised at Monument, the 2-1 Nebraska lots involving the first progeny from the special Nebraska seed trees selected in 1926, and the 2-2 Douglas fir heredity lots from six local seed trees were analyzed in the laboratory, this work taking up most of the latter part of the month. About 500 representative trees were thus studied. Much interest was centered in the lots produced by artificial selfing and crossing, which on the average, were somewhat smaller than stock from the same altitudinal range produced naturally. Also Strain A (mistletoe resistant) western yellow pine stock apparently develops more slowly than the normal strain of this species. It is expected that the transplants will be allowed to develop two more years at Monument when they will be field planted under conditions to test relative vigor as a function of altitudinal range, possibility of species improvement by propagation of desirable strains, and the comparative development of pure and mixed strains under equitable conditions.

Frequent observations were made of the Douglas fir trees involved in the seed production experiment because of the excellent opportunity offered this spring for getting some definite leads on the effect of climatic

conditions upon flowering in this early blossoming species. An exceptionally warm and dry April with a mean temperature almost 9° above the normal of approximately 34° F at Fremont resulted in vegetation getting a two weeks' earlier start than usual. May, in line with the abnormal and contradictory tendencies which have prevailed in weather conditions since the first of the year, was exceptionally cool, and wet, with a mean temperature 1.22° below that of April, and 19.7" of snow as compared with April's 8.3". Frequent killing frosts with minima down to 19°, not only killed off such Douglas fir flowers which had emerged, roughly above an elevation of 8000 feet, but appear to have literally nipped the flowers in the bud, and so far as can be determined the cone crop of this species will be very meagre, at least at the higher elevations.

On May 27 and 28, the Regional Camera Point Committee, consisting of Messrs. Cochran, Office of Management; Douglas, Office of Grazing; Supervisor Keithley; and Roeser met in Denver. The Committee prepared a preliminary outline which shall constitute the basis for classifying and indexing the Regional photographic collection, and selected, from the photographs submitted by various Forests, those which are deemed worthy for inclusion in the Regional collection and for which permanent camera points shall be established.

Ranger Leadbeater completed most of the work in connection with compiling and tabulating the 1929 meteorological observations in the type study and moved to Fremont on the 20th. For the first few days, he and Williamson carried on the cutting operations in Block A of the Station forest necessary to place this area in the category of "regulated forest." No clean up work was attempted at this time since plenty of time will be available during the summer to undertake this. Some cutting also was done in two of the remaining four plots in Block C. In addition, Leadbeater and Roeser marked a one-acre plot in Block B bearing a heavy stand of overmature Douglas fir which also will be cut during the year.

With the closing of the first series of 1929 greenhouse seed tests, including the Nebraska commercial seed-lot tests, space was made available for another series to consist of Douglas fir in the Holy Cross and Engelmann spruce in the White River and Fremont seed production experiments. The test samples for the various lots involved were prepared by Leadbeater and sowing will be accomplished shortly after June 1. Leadbeater also made the spring seedling counts in the ten cans which comprise the "moisture requirements of coniferous seedlings" test.

Improvement work at Fremont consisted in the main of rebuilding the one-half mile power line leading into the Station, for which extra help was employed and which required the attention in whole or part of all members of the Station staff during the last two weeks of May.

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Dana, S. T.	Forest Fires in Maine, 1916-25. (Bul. 6 of the Maine Forest Service.
Eyre, F. H.	Christmas Trees, a Profitable Farm Crop in Some Localities. (Yearbook, 1930)
Forbes, R. D.	What Uncle Sam does to Solve the Forest Problem. (Engineers and Engineering, April, 1930.)
Horn, E. E. and Gabrielson, Ira N.	Porcupine Control in the Western States (Leaflet No. 60.)
Hursh, C. R.	Forestation Averts Erosion on Abandoned Mountain Farm Land. (Yearbook, 1930).
Pearson, G. A.	Forest-Grown Evergreens can be Transplanted if Proper Care is Taken. (Yearbook, 1930)
" "	Studies of Climate and Soil in Relation to Forest Management in the Southwestern United States. (Ecology, Feb. 1930)
Pessin, L. J.	Timber and Cattle can be Raised together on Southern Cut-over Land. (Yearbook, 1930)
Stickel, P. W.	Translation of "Investigations of the Significance of Tree Mycorrhiza, An Ecological - Physiological Study," by Dr. Elias Melin. (Translation published by Edwards Bros. Ann Arbor, Mich. 1930)
Westveld, M.	Spruce regeneration in Eastern Canada and Northeastern United States. (Forestry Chronicle, Feb. 1930).
Zon, Raphael	Where White Pine once was King. (Nature Magazine, May, 1930)

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FOREST PRODUCTS - REGION 1

Annual Program Conference Held Madison April 28 to May 9.

Mr. Bradner of the Region One Office of Products attended the annual program conference at the Forest Products Laboratory, Madison, Wisconsin, held April 28 to May 9, inclusive. A resume of the work in all branches of forest research, results accomplished, progress and future plans, occupied the first week of the conference in a general meeting. Two full days were allotted to a discussion of the Forest Survey. C. M. Granger, Director of the Survey and several of the key men in the organization were present. Three committees working evenings and on several afternoons discussed and reported on three separate phases of the Survey, namely, inventory, growth and drain, and requirements. Representatives of nine forest experiment stations were present and reported briefly on the work within their respective regions. Prior to the opening of the general conference members of the committee on forest fire research held a 3-day meeting. The report of this committee was read at the general meeting. Work of the Laboratory, Regional Products Offices, and the Offices of Forest Economics, Insect Investigations and Pathology were reported upon briefly in the general meeting. During the second week of the conference a more detailed discussion was held of the Laboratory work by sections and projects.

Thirty-six visiting forest officers representing all but one of the nine administrative regions and including men in all lines of forest research were present for at least a part of the conference. Forester R. Y. Stuart attended the first day's meeting. Assistant Regional Forester L. C. Stockdale and H. T. Gisborne, Silviculturist with the Northern Rocky Mountain Experiment Station, as well as Mr. Bradner, represented Region One at the conference.

Stumpage Prices

Statistics for 1930 have been compiled with the exception of the Indian Service report. This project has been enlarged by a recompilation of all stumpage data on hand. Data will be grouped, assembled and summarized for six major agencies. They are:

U. S. Forest Service
U. S. Indian Service
State of Idaho
State of Montana
Idaho mills
Montana mills

The final compilation will show by years for the above agencies, individually and combined, the total volume, total value, and average value per M or other unit for each species represented in the heading of the form.

Average prices received for the various species in the 1929 Forest Service stumpage transactions are as follows:

(1)	Cedar	$6.86 per M
	Western White Pine	3.60 " "
	Lodgepole Pine	2.80 " "
	Western Yellow Pine	2.57 " "
(2)	Douglas Fir	1.75 " "
	Englemann Spruce	1.37 " "
	Larch-Douglas Fir	1.09 " "
	Mixed Timber	.65 " "
	Average All Species	3.82 " "

(1) Includes all cedar products converted to log scale basis
(2) From sales reported by Forests east of the Continental Divide.

Woods Waste Study

Mr. Anderson now has one assistant securing data on breakage in felling of white pine under summer conditions at the Potlatch Lumber Company camps. A few weeks work in the camps of the Priest Lake region will complete the field work on this project. It is also planned to finish the breakage in felling study in the larch-Douglas fir type about the middle of the summer. Figures on breakage in felling will be available for the yellow pine, white pine and larch-Douglas fir types of this Region by next December.

Census

A considerable reduction was made in the number of concerns in Idaho and Montana which had not been accounted for at the beginning of the month. Many of the cases on which editing had been delayed through the necessity of securing supplemental information were cleared up. The tabulation of 410 production reports for regional purposes was completed by this office. These completed schedules were mailed to the Forester on May 26. Another consignment of completed schedules will be ready for transmittal to Washington in a few days.

Lumber Prices and Movement

Av. Mill-Run Prices	Annual 1928	Annual 1929	1st Q. 1930
Idaho White Pine	$31.09	$34.33	$35.33
Western Yellow Pine	24.51	26.17	24.57
Larch-Fir	18.55	20.29	18.34
White Fir	18.26	20.94	19.45
Spruce	23.20	24.23	23.51

Shipments and Cut

	1929	1930
Shipment	171,495	134,854
Cut	166,647	169,361

Miscellaneous

During the month 300 reprints of the article 'Log Damage in Gravity Chutes" by I. V. Anderson were received from The Timberman. These reprints are being distributed to interested lumbermen and foresters throughout the region.

"Fire-Damaged Logs - The Loss?" an article based on a depreciation study of fire-killed western white pine timber logged and milled one and two years after the burn and written by Mr. Bradner and Mr. Anderson appears in the June issue of The Timberman. Four hundred reprints will be supplied the Products Office by The Timberman.

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FOREST PRODUCTS - REGION 6

General

Gibbons was away from the office the first half of the month attending the annual allotment conference of the Forest Products Laboratory, Madison, Wisconsin.

Word has just come that the President has approved the bill appropriating $25,000 for pulp and paper investigations on western woods, particularly Douglas fir. This sum, if appropriated annually, will permit a

well-rounded-out program for work on research on western woods with particular emphasis to start with Douglas fir.

Douglas fir lumbermen andloggers are feeling the depression in the lumber market very keenly. Many of the yards are full to overflowing with no signs of a normal lumber demand in sight. Practically all the mills are curtailing their output. Some mills and many of the loggers have entirely suspended operations for the present; other mills are running only five days per week with those that normally run two or three shifts laying off their night crews. Lumber, it seems, can not be sold at any price, a condition which northwest lumbermen have not experienced for many years, if ever.

Felling and Bucking Study in the Douglas Fir Region

Intensive field work on the felling and bucking study started during the month by Johnson and Spelman at the Ryderwood, Washington operation of the Long-Bell Lumber Company. Spelman is making the observations in connection with the felling of the timber while Johnson is giving particular attention to the work of bucking. The study is being conducted on a unit-area basis with the object of observing all the details from start to finish of the falling and bucking operation. The practice among timber fallers, especially in big timber, is to make an initial cutting for the big and heavy trees followed by a second cutting, called a "pick-up", for the remaining timber on the same area. The study areas are therefore more or less contingent on the extent of ground covered by a set of fallers up to and including their "pick-up". So far the field work on one plot has been completed with observations on a second plot under way.

Two buckers work with each set of fallers. The logs are bucked into lengths ranging from 12 to 64 feet, the shorter logs coming from the tops and between breaks. In bucking out the breaks the buckers receive the scale of a 24-foot log with a diameter equal to the top diameter of the break. The fallers receive no scale for such logs. In cases where the top of a log is so situated that the buckers cannot get at it, the fallers alone are credited with the scale of such a log. In the case of "sidewinders" the buckers make the stump cut for which they received the scale of a log 24 feet long with a top diameter equal to that of the stump.

Spelman, in dealing with the work of the fallers, has occasion to observe the extent to which fallers can fall leaning trees away from the direction of lean. One 4-foot tree with a lean of 3°40' whose crown projection was 17 feet off the stump, was felled 76° away from the direction of the lean. The fallers used an 8-inch dutchman on the compression side and held 9 inches of wood on the tension side and felled the tree with practically no wedging. A dutchman, sometimes called a kicker, usually consists of leaving a part of the undercut unchopped but severing the stump.

Western Yellow Pine Utilization Study

Spelman spent the early part of the month in analyzing the data collected in connection with the Shevlin-Hixon study with the object of bringing out the relative values in different parts of trees of different sizes, from stump to the top of the tree. This, together with some analysis already done by Johnson and Meyer as to relative quality of trees according to the Dunning classification, will form the basis for a second report on this study.

General Survey of Sawmill Waste in the Douglas Fir Region

Hodgson continued with the computing of the data secured in the study of sawmill waste at four hemlock mills. He also spent five days in the Grays Harbor and Puget Sound districts for the purpose of getting additional data regarding the character of sawmill waste at the mills previously studied.

1929 Census of Lumber, Lath, Shingles, Logs, Cooperage and Veneer

Johnson spent the first week of May editing questionnaires. Gibbons spent four days in the field securing reports from companies who for one reason or another failed to submit their report by mail. The survey is now well toward completion having reached the mopping-up stage.

Publications

Hodgson's paper entitled "Logging Waste: A Challenge to the Pulp Industry of the Douglas Fir Region", presented by him at the meeting of the Pacific Coast Section of the Technical Association of the Pulp and Paper Industry, held at Longview, Washington in April, was published in the May, 1930 issue of "The Paper Industry". The publishers furnished this office with 100 reprints of the article, most of which have been distributed. His paper was commented on favorably in the April issue of "The Pacific Pulp and Paper Industry", and "The Paper Industry".

FOREST TAXATION INQUIRY

North Carolina

The clerical work in Beaufort and Chatham counties was practically completed during the month, as well as most of the field examinations in Beaufort. The plan by which Mr. W. E. Bond of the Southern Station made a study of the financial aspects of private forestry in Beaufort County in cooperation with the work of the Inquiry seems to have been very successful. Hall spent the last part of the month in the field with Wager and Thomson. He also attended the annual meeting of the Appalachian Forest Research Council at Asheville on May 29 and 30, giving a talk on the North Carolina work. It was decided not to extend the project to cover a southeastern county owing to the lack of adequate assessment records in the counties of that region which are suitable from the point of view of forest conditions.

Eastern States Financial Study.

Allin spent part of the month in the field in connection with this project. The collection of data was largely completed during the month.

New Haven Office.

Progress Report No. 11 entitled "Property Taxation in Selected Towns in the Forest Land Regions of Minnesota" was completed and sent to the Washington office for publication in the usual form. This report contains a large amount of detailed information with respect to specific localities in Minnesota chosen as typical examples of forest and tax conditions. Two other progress reports were brought very close to completion during the month.

WASHINGTON

Forsling in on Short Detail

Director Forsling of the Intermountain Station came in to Washington for about 10 days in connection with station matters. Principal consideration was given to considering the manuscript covering the study of erosion at the Great Basin Substation with the editor and considering plans for next year and personnel with Mr. Clapp and Chapline.

Pan-Pacific Food Conservation Luncheon

Chapline as a representative of the Forest Service attended a luncheon at the Cosmos Club given by Mr. Alexander Hume Ford, Director of the Pan-Pacific Union, to consider the second Pan-Pacific Food Conference to be held in Honolulu in August, 1931. Mr. Ford had as his guests Director Woods and numerous chiefs of bureaus and other representatives of the Department of Agriculture, also representatives of the Department of Commerce, Coast and Geodedic Survey, Carnegie Institution, U. S. Chamber of Commerce, Institute of Economics, Federation of Labor, and several other organizations. The tentative program as planned was considered and suggestions made as to possible changes in it. Mr. Ford indicated that the Pan-Pacific Union, which is sponsoring it, is very much interested in the forestry phase and especially the water relationship and erosion phases of forest and other vegetation. The conference is apparently supported by the United States, various Pacific Islands, Japan, China, Australia, and New Zealand. The Central and South American countries bordering the Pacific, however, are becoming more interested in the conference.

International Livestock Exposition Exhibit

A conference was held in Dr. Warburton's office on May 2 to discuss the Department exhibit for the International Livestock Exposition in Chicago next fall. It is planned that next fall's exhibit shall emphasize the work on sheep. The suggestion was made that the Forest Service part of the exhibit cover one of the following features: (1) Proper frequency and intensity of utilization of range forage by sheep; (2) deferred and rotation grazing on sheep ranges; (3) the open herding and bedding out system for handling sheep, and (4) the management of spring-fall range as shown by the results of the cooperative experiments at the U. S. Sheep Experiment Station under the direction of Forsling.

Visitor

Arthur T. Esgate, Executive Vice-President of the Valley Bank with main headquarters at Phoenix, Arizona, stopped off in Washington returning from the Council meeting of the American Bankers Association. He was much interested in the present situation regarding the plans for the Southwestern range and erosion research.

FORAGE INVESTIGATIONS

Dayton left for a two months' field trip to the Southwest and Intermountain Regions May 28th. Chief activity in May revolved around three publications.

Browse Bulletin

Final consideration was given editorial questions and the manuscript has now gone over to the Department.

Glossary of Common Botanical Terms

About twenty additional drawings were made for this prospective publication, which have enabled putting the figures in very nearly strict alphabetical order and thus will make it much more readily usable.

Artificial Reseeding Bulletin

Forsling's detail to the Washington office has enabled a final review of the artificial reseeding bulletin by Forsling and Dayton, the authors. The revised manuscript has accordingly been resubmitted.

District 1 issued Instructions on Plant Collection

Mr. Barry C. Park has submitted from the Missoula office a copy (7 pages, single-space) of his "Directions for submitting plant material to Washington. Care of collections and herbarium." It is a fine piece of careful, detailed work.

Inventory of Range Plant Drawings

Mrs. Thompson has made an inventory of the range plant drawings made during a series of years by Mrs. Hoyle, Mrs. Brenizer, and Miss Batts, under

Dayton's supervision. There are now 160. A good many of these will appear in the general browse bulletin and probably more than half of the residue in Talbot and Dayton's bulletin of Southwestern range plants after the appearance of which they will be released for general requisition through the Washington office photographic collection under the Branch of Public Relations.

Miscellaneous

Eleven collections of 97 plants were submitted to the Bureau of Plant Industry for formal determination. About one thousand plants were returned from the Bureau of Plant Industry and have been prepared for reporting the determinations out to the field next month. Forty specimens were mounted.

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RANGE RESEARCH - REGION 3

APRIL AND MAY

All of the field force spent the last half of April in the Lower Tonto and Salt River Basins on the Tonto and Crook Forests. Measurements and records were taken on erosion stations. Transects on ground floor vegetation above several erosion stations were mapped. Seasonally used, panel controlled plots in both the Semi-desert and Chaparral Zones of vegetation were closed and records made.

Cooperrider left the field party for Tucson to attend the conference on wild life, forest and range, called by President Shantz of the University of Arizona for April 26. This conference brought together approximately 65 representatives from different agencies interested in the use and administration of land not suited to farming, but upon which agriculture is dependent for water. While the conception of the project was in Arizona, a number of other states were represented and delegates were present from research agencies in Washington and throughout the Southwest.

The primary purpose of the meeting was to stimulate interest in and to correlate the efforts of local agencies dealing with native vegetation and its source, the land, insofar as the measurement of physical factors is concerned in the study of these matters. The idea involves the establishment of stations to measure physical factors in each of the primary plant zones in Arizona. Its purpose is that of securing measurements of the natural influences by like methods of instrumentation in each zone regardless

of the agency sponsoring the station. Its ultimate attainment would mean a chain of stations that would serve as research bases and that would furnish comparative physical factor records for field investigations at large. The idea is a product of deep thought and wide experience in dealing with plant life. Through cooperative effort, it seems possible to obtain complete basic data that there is no immediate prospect of any single interested agency being able to secure. This project is of tremendous importance to research if investigation is to bring to light the facts upon which any land usage rests that will result in the maintenance of natural resources.

On a return trip from Tucson, Krauch, Associate Silviculturist of the Southwestern Forest Experiment Station, made the overland trip with us across the Crook Forest through the Tonto Basin and across the Coconino Forest to Flagstaff. Lowdermilk of the California Forest Experiment Station met us at Globe on April 28. The day of the 29th was spent going over project work in the vicinity of Roosevelt with Lowdermilk.

May 1 saw the beginning of the spring work on range and tree reproduction investigations in the sawtimber type on the Arizona Plateau. All of the reproduction and vegetation plots on the experimental cattle and sheep ranges have been checked for damage to seedlings that has occurred during the winter and for growth data on the advancement of forage species. It is very necessary to segregate these natural influences and to record the stage of development of vegetation before stock enter the range in June.

On the evening of May 23, Cooperrider met Inspector Hill of the Washington Office of Range Management, Shoemaker of the Albuquerque Office of Range Management, Supervisor King and Naylor of the Crook Forest, Sizer and Wiltbank of the Tonto Forest, Director Culley of the Santa Rita Range Reserve and Professor McGinnies of the University of Arizona, at Roosevelt dam. The days of the 24th and 25th of May were spent going over experimental tracts that could be reached within a 40 mile radius of this base.

Erosion, revegetation, range utilization and vegetation studies were examined in the field. The conclusions reached from these studies, as to what constitutes the vegetation in the undisturbed and the disturbed state in the semi-desert and chaparral zones of the southwestern brush belt, the causes for disturbance, the possibilities of range use, of revegetation, and of control of erosion were discussed on the ground. During the evening round-table discussions on the application of the findings of research in management were conducted.

It was a disappointment that Dayton of the Office of Range Research at Washington could not be present as had been anticipated.

It is hoped that the visitors were in a small part as well repaid for these two days as was Research in explaining results and in meeting the questions asked.

The summer field season is with us. We have better facilities for conducting work than ever before, but it would seem that with every unit of resource secured, the needs for fact-finding in going projects increase two-fold.

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SANTA RITA RANGE RESERVE

Range and Stock Conditions

Range generally over the reserve is about normal for this season of the year, an appreciable amount of growth having taken place in both perennial grasses and spring annual species. Under protection and on areas where some of last summer's growth is left, the more important perennial grasses on the reserve have shown anywhere from three to eight inches growth, some species even heading out, a condition that is very unusual during the spring. Where a full or overused stage has already been reached, growth of perennials has been from one to four inches, or noticeably less than where some protection was afforded from old grass. Spring annuals have not shown as good growth as in some other years and can hardly be classed as more than slightly above normal. The answer to the unusual perennial growth is found in spring rainfall with an average - over the reserve - of approximately six and one-half inches or nearly two and a half times the past seven-year average. Amount of rainfall alone tells part of the story and we must look to both character and distribution for an explanation of the perennial growth.

Cattle are generally in good to excellent condition at present with a comparatively few in the lower pastures that have not slicked off as early as spring range conditions would seem to warrant.

Recent observations over the lower ranges in this region indicate that cattle are generally thrifty though not in nearly as good flesh as those on the reserve.

The market is comparatively slow and such calves as have been sold this spring brought about five dollars per head less than last year.

Precipitation Notes (Continued from February)

The study of precipitation records on the Santa Rita has proven intensely interesting even though attempts to correlate the influence of amount of rainfall with density changes of our more important range grasses, have not proven as satisfactory as had been hoped for. The information so far collected gives us a reasonably sound basis for concluding that our

winter and spring rains exert the most definite influence upon density or stand of perennial range grasses. However, it is very evident from close analysis of the records, that there are many factors that influence the effectiveness of rainfall and these must be very closely observed before we can arrive at a final measure of yearly stand variations due to rainfall conditions. Some of the factors that influence effective rainfall are: 1. amount; 2. character or intensity as influencing run off; 3. distribution throughout each season of the year; 4. time of day when rain occurs; 5. temperature as influencing evaporation; 6. amount lost through run off; and, 7. soil conditions.

Erosion Studies on the Tonto

During the latter part of May, a party consisting of Messrs. Hill, McGinnies, Shoemaker, King, Naylor, Wiltbank, Sizer and Culley were conducted over the Roosevelt watershed by Cooperrider who explained the various projects he has under way and some of the methods by which he hopes to reach a solution of the problems affecting the watershed. The trip proved well worth while and produced some interesting discussions on various phases of the work. The vegetative possibilities of the lower ranges in the watershed, as indicated by protected areas, are almost beyond belief. Incidentally "Coop" has a lot of steep hills on the watershed and seemed to get a lot of enjoyment in walking the party up and down each one several times. We suggest that he put in tramways for the convenience of future visitors.

Miscellaneous

May first marked the change of headquarters for the reserve personnel, from Tucson to Florida Station for the summer field season. Somewhat unusual weather conditions for this season of the year, made it necessary to get out all our blankets in an effort to keep warm during the first few nights at the station.

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JORNADA RANGE RESERVE

Dry but Undaunted

The Jornada has had but .07 inches precipitation recorded at headquarters since March. Other parts of the reserve have had less than this and near the mountains the rain has been only slightly heavier. Conditions, however, are not bad; there is a good growth of weeds and most of the grasses are growing fairly well. Rain in the next few days seems likely.

Cattle in Good Condition

Supplemental feeding has not been necessary on the Jornada this year though most of the ranches in this vicinity have been feeding rather heavily. The spring roundup and branding, recently completed, shows the cattle to be in good condition and one of the best calf crops in years. The cattle in the mountain pasture are doing especially well.

Rodent Control

Through Mr. Gatlin, the Biological Survey is furnishing the Jornada with 2600 pounds of poisoned grain to be used against the Kangaroo Rats particularly. The work will take place early in June and should clean the rodents out of the most badly infested parts of the Reserve fairly completely.

Another man for Jornada

The Jornada is to have a second summer assistant this year, Oran B. Stanley of Indianapolis, Indiana, who is a Junior at Butler University. This is his first work in the Forest Service.

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